

ANNEX 1
BETWEEN
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
AND
AEROJET ROCKETDYNE, INC
UNDER
SPACE ACT UMBRELLA AGREEMENT NO. 36944
FOR
CERAMIC MATRIX COMPOSITE DUCT FABRICATION AND TESTING

ARTICLE 1. PURPOSE

This Annex is for the collaboration between the National Aeronautics and Space Administration and Aerojet Rocketdyne to enhance Hypersonic Flight. NASA will perform load test for a CMC (ceramic matrix composite) duct clamped to a metallic duct. The clamp configuration results in a load path through the flange of the CMC duct where the clamp will be attached. This testing will validate test methods as well as provide insight into the load capability of the CMC duct/clamp configuration.

The legal authority for this Annex, consistent with the Umbrella Agreement, is in accordance with the Space Act, Other Transactions Authority (OTA), 51 U.S.C. § 20113(e).

ARTICLE 2. RESPONSIBILITIES

A. NASA LaRC will use reasonable efforts to:

1. Provide SMEs to develop and provide fabrication plans for holding fixtures and replica of the CMC duct.
2. Fabricate a metallic replica of the CMC duct that could be instrumented that would allow load distributions to be understood without damaging the CMC part.
3. Fabricate a holding fixture that would ensure that the loads applied to the CMC duct are focused at the part's flange and not at the holding fixture.
4. Fabricate a holding fixture that would ensure that the loads applied to the CMC duct are focused at the part's flange and not at the holding fixture.

B. Partner will use reasonable efforts to:

1. Establish a test procedure that can apply appropriate loads to the CMC duct that would replicate loads that would be experienced in service.

2. Interact with and support LaRC personnel in a timely manner for the development of CMC duct.
3. Document test procedure for future CMC component testing.

ARTICLE 3. SCHEDULE AND MILESTONES

The planned major milestones for the activities for this Annex defined in the "Responsibilities" Article are as follows:

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|---|---|
| 1. Partner to provide hardware requirement definition and test procedure. | Within one month of the Annex being established |
| 2. NASA to provide SMEs to develop and provide fabrication/design plans of test fixture. | Within 2 months of completion of Milestone 1. |
| 3. Partner to provide NASA with access to information and support necessary to carry out its responsibilities under this Annex. | Within 2 months of completion of Milestone 2. |
| 4. NASA to provide structural analysis of CMC duct. | Within 3 months of completion of Milestone 3. |

ARTICLE 4. FINANCIAL OBLIGATIONS

A. Partner agrees to reimburse NASA an estimated cost of \$43,595 for NASA to carry out its responsibilities under this Annex.

Each payment shall be marked with Langley Research Center.

B. NASA will not provide services or incur costs beyond the current funding. Although NASA has made a good faith effort to accurately estimate its costs, it is understood that NASA provides no assurance that the proposed effort under this Annex will be accomplished for the estimated amount. Should the effort cost more than the estimate, Partner will be advised by NASA as soon as possible. Partner shall pay all costs incurred and have the option of canceling the remaining effort or providing additional funding in order to continue the proposed effort under the revised estimate. Should this Annex be terminated, or the effort completed at a cost less than the agreed-to estimated cost, NASA shall account for any unspent funds within three (3) months after completion of all effort under this Annex, and promptly thereafter, at Partner's option return any unspent funds to Partner or apply any such unspent funds to other activities under the Umbrella Agreement. Return of unspent funds will be processed via Electronic Funds Transfer (EFT) in accordance with 31 C.F.R. Part 208 and, upon request by NASA, Partner agrees to complete the Automated Clearing House (ACH) Vendor/Miscellaneous Payment Enrollment Form (SF 3881).

ARTICLE 5. INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS

A. Data produced under this Annex which is subject to paragraph C. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement will be protected for the period of one year.

B. Under paragraph H. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement, Disclosing Party provides the following Data to Receiving Party. The lists below may not be comprehensive, are subject to change, and do not supersede any restrictive notice on the Data provided.

1. Background Data:

The Disclosing Party's Background Data, if any, will be identified in a separate technical document.

2. Third Party Proprietary Data:

The Disclosing Party's Third Party Proprietary Data, if any, will be identified in a separate technical document.

3. Controlled Government Data:

The Disclosing Party's Controlled Government Data, if any, will be identified in a separate technical document.

4. The following software and related Data will be provided to Partner under a separate Software Usage Agreement:

None

ARTICLE 6. TERM OF ANNEX

This Annex becomes effective upon the date of the last signature below ("Effective Date") and shall remain in effect until the completion of all obligations of both Parties hereto, or one year from the Effective Date, whichever comes first, unless such term exceeds the duration of the Umbrella Agreement. The term of this Annex shall not exceed the term of the Umbrella Agreement. The Annex automatically expires upon the expiration of the Umbrella Agreement.

ARTICLE 7. RIGHT TO TERMINATE

Either Party may unilaterally terminate this Annex by providing thirty (30) calendar days written notice to the other Party.

ARTICLE 8. POINTS OF CONTACT

The following personnel are designated as the Points of Contact between the Parties in the performance of this Annex.

Management Points of Contact

NASA Langley Research Center

Shelly M. Ferlemann

AST, ENGINEER PROJECT MANAGEMENT

Mail Stop: E1A

Langley Research Center

Hampton, VA 23681

757-848-0048

shelly.m.ferlemann@nasa.gov

AEROJET ROCKETDYNE, INC

Thomas Fortin

Hypersonics Project Engineer

15270 Endeavor Drive

Jupiter, FL 33478-6447

Phone: 561 882 5292

Thomas.fortin@rocket.com

ARTICLE 9. MODIFICATIONS

Any modification to this Annex shall be executed, in writing, and signed by an authorized representative of NASA and the Partner. Modification of an Annex does not modify the terms of the Umbrella Agreement.

ARTICLE 10. SIGNATORY AUTHORITY

The signatories to this Annex covenant and warrant that they have authority to execute this Annex. By signing below, the undersigned agrees to the above terms and conditions.

NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER

BY: _____

Mary S. DiJoseph, Director
Aeronautics Research Directorate

DATE: _____

AEROJET ROCKETDYNE, INC

Stephen
Smithwick

Digitally signed by
Stephen Smithwick
Date: 2022.08.11
13:43:05 -04'00'

BY: _____

Stephen Smithwick
Sr. Manager, Supply Chain
Management- WPB Programs

DATE: _____